



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(51) International Patent Classification <sup>6</sup> :</b><br><b>A61M 5/32, 5/20</b>   | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 99/22792</b><br><b>(43) International Publication Date:</b> 14 May 1999 (14.05.99)  |
| <b>(21) International Application Number:</b> PCT/IT97/00273<br><b>(22) International Filing Date:</b> 3 November 1997 (03.11.97)<br><b>(71)(72) Applicant and Inventor:</b> GRECO, Ermanno [IT/IT]; Viale Liegi, 6, I-00198 Roma (IT).<br><b>(74) Agent:</b> SNEIDER, Massimo; Studio Tecnico Lenzi, Via Lucania, 13, I-00187 Roma (IT).  |           | <b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i> |
| <b>(54) Title:</b> SELF-INJECTION DEVICE<br><br><b>(57) Abstract</b><br><p>The present invention concerns a mechanism for allowing self-injection with a mechanical injector consisting of a syringe with a disposable needle, in conditions of safety, by preventing the accidental separation of the needle and the consequent expulsion of the needle from the injector.</p> <div> <p>The diagram shows a vertical cross-section of a self-injection device. It consists of a main body (2) with a plunger (3) and a needle (4). A safety mechanism (5) is shown in a retracted position, allowing the needle to be extended. Other components labeled include 11, 12, 13, and 14, which are parts of the internal mechanism and the needle assembly.</p> </div> |           |   |

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## DESCRIPTION

### SELF-INJECTION DEVICE

#### Technical Field

The present invention concerns a mechanism for allowing self-injection with  
5 a mechanical injector consisting of a syringe with a disposable needle, in  
conditions of safety, by preventing the accidental separation of the needle and  
the consequent expulsion of the needle from the injector.

#### Background Art

Self-injection devices are widespread and have been used for a long time now  
10 in the treatment of various pathologies, with satisfactory results.

Said devices are generally cylinder-shaped and resemble a pen, inside which  
there is a piston activated by a spring which, when it is released by the patient,  
strikes the syringe plunger and makes the injection.

This device however, may feature shortcomings, due to the separation of the  
15 needle during the injection, which is the cause of obvious discomfort.

#### Disclosure of Invention

According to the present invention, the syringe inside the device is housed  
within an elastic sliding bush which moves forward together with the syringe  
during the injection: the lower end of the elastic bush container is tapered,  
20 which prevents the needle from separating from the device at the end of the  
stroke, during the injection.

The situation whereby the needle accidentally projects from the syringe may occur because the end section of the bush must be elastic and capable of being widened to extract the needle-cap, therefore, when the piston strikes the syringe plunger, the needle might go beyond the elastic barrier represented by the bush and be expelled.

To prevent this from occurring, the container inside which the bush slides is tapered at the lower end, as mentioned above, and this prevents the elastic end of the bush to widen when it reaches the end of the stroke, i.e. at the injection.

#### **Brief Description of the Drawings**

A specific embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 shows a partially exploded view and a cross-section of the lower and upper ends of the device;

Fig. 2 shows a partial cross-section of the device when the needle-cap is removed;

Fig. 3 shows a partial cross-section of the device at the injection;

Fig. 4 shows the lower end of the device after the injection, during the reloading operation.

Referring to the drawings, the device described herein features a tapered

section 11 at the lower end of the cylinder 5, which prevents the end section 12 of the elastic bush 4 from expanding when, due to the effect of the injection, the bush 4 reaches the end of the stroke; in the situation shown in fig. 3, the end section 12 of the bush 4 are forced to remain in the resting

position, thus preventing the accidental projection and separation of the needle 2 of the syringe 1. As previously mentioned, the accompanying drawings show the various stages of operation of the device, before, during and after the self-injection.

5 In Fig. 1, the syringe 1, ready for use, is inserted into the lower end the self-injector, while the elastic bush is blocked by the button 7; the syringe is pushed into the bush 4 until the flexible section 12 of the bush clicks into place.

The flexible end 12 of the bush 4, by opening outwards, enables the passing of  
10 the needle protection 3 and, after this, it adheres to the plastic part of the needle 2, positioning itself between the collar 2 and the protection 3.

In fig. 3, the device is shown with the top part of the self-injector screwed into place, while the needle protection 3 is removed by pulling it downward.

Fig. 3 shows how, by activating the triggering mechanism in the top part of  
15 the self-injector, the syringe 1 and the bush 4 slide down until the end of stroke, represented by the gasket 10; the tapered section 11 of the cylinder 5 prevents the elastic section of the bush 4 from opening at the end of stroke 10 and, therefore, keep the needle firmly attached to the syringe.

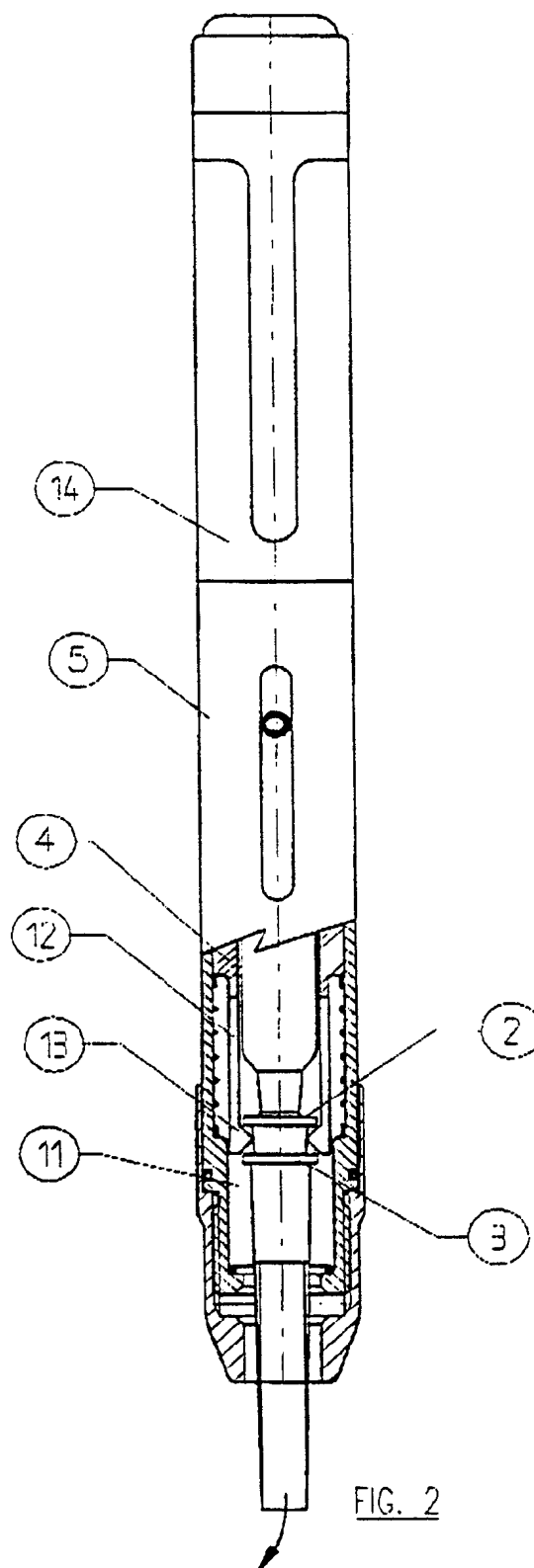
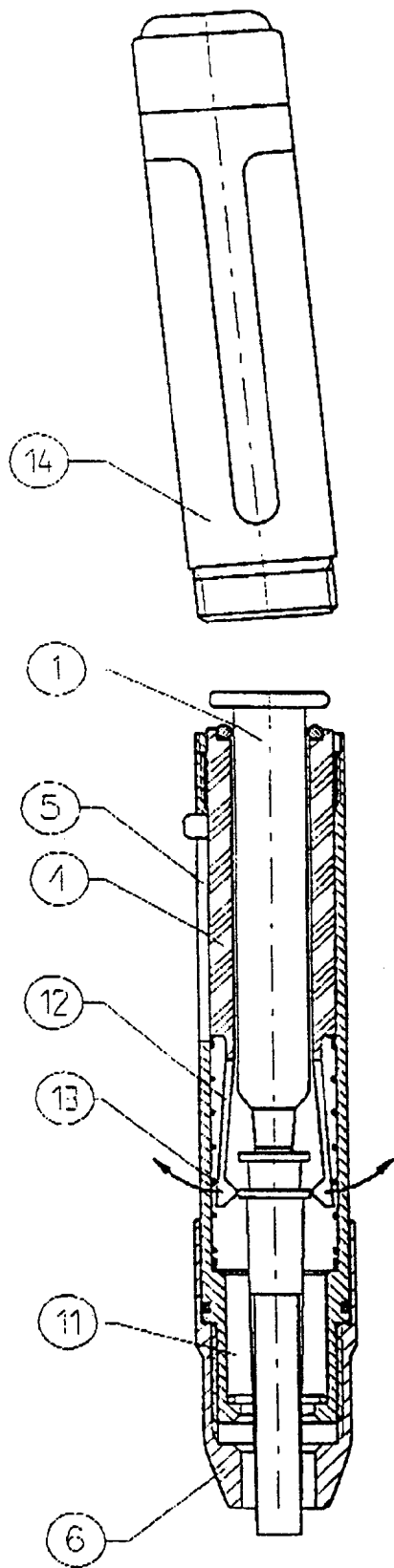
Fig. 4 shows how, at the end of the injection, the protection 3 is placed over  
20 the needle and the top part of the injector removed; the return spring 8 causes the syringe to return into the lower part of the cylinder 5, thus freeing the elastic section of the bush and enabling the extraction of the syringe with the needle protection. The preferred embodiment described and illustrated above

may be modified in accordance with the state of the art, but in compliance with the following claims.

### CLAIMS

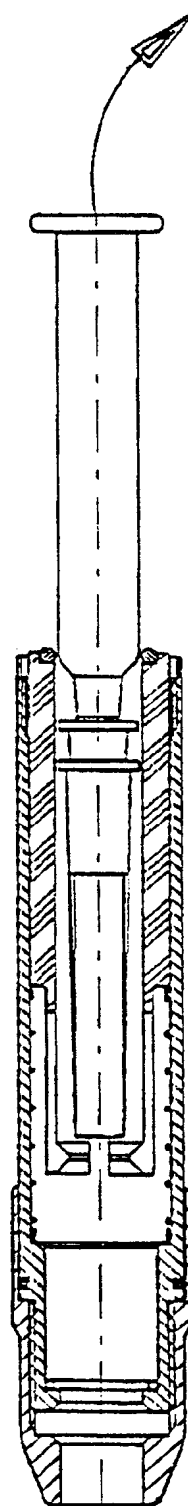
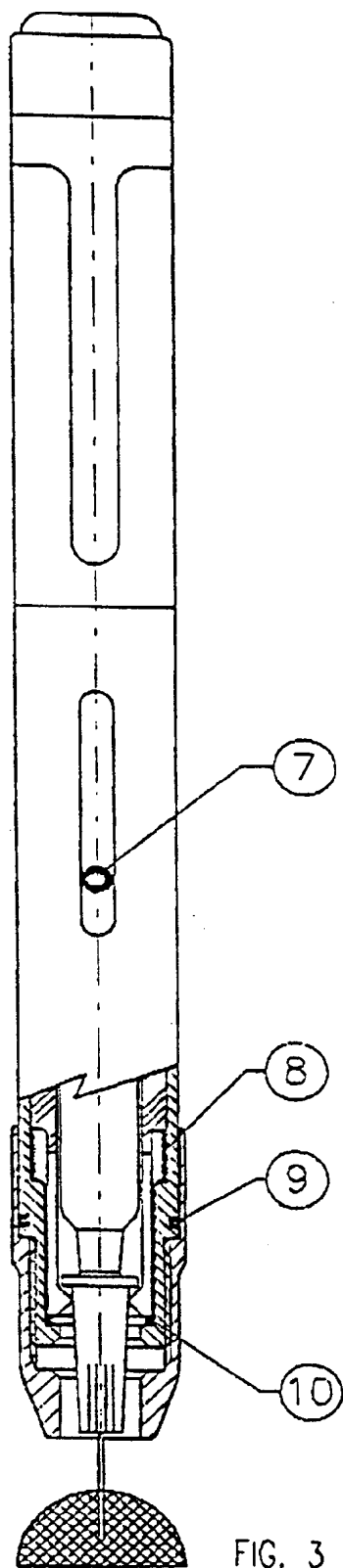
- 1- A safety system for the disposable needles used for self-injection devices characterised by the fact that the bush 4, furnished with elastic terminals 12 and a hook 13; characterized by a specific form, permits insertion and removal after use of the syringe with the removable needle together with its protective cap.
- 2- Safety sistem for removable needles used in autoinjection devices characterized by the fact that, with the syringe inserted, the hook 13 of the elastic terminals 12, locates between the needle's protective edge 3 and the plastic edge of the needle 2 itself.
- 3- Safety sistem for removable needles used in autoinjection devices characterized by the fact that, with the syringe inserted in the bush 4, at the moment of screwing the upper part 14 to the lower 5, the elastic terminals 12 of the bush 4 position themselves in the restriction 11 of the cylinder 5, already preventing the elastic terminals 12 expanding outwards, in such a way that the removable needle is prevented from detaching from the syringe.
- 4- Safety sistem for removable needles used in autoinjection devices characterized by the fact that during injection the terminals 12 remain positioned in the restriction of the cylinder 5 preventing detachment of the needle consequent upon impact of the bush 4 with the end stop 10.

1/2





2/2



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 97/00273

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A61M5/32 A61M5/20

According to International Patent Classification(IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|----------|---|-----------------------|
| X        | WO 94 26331 A (OWEN MUMFORD LTD ;MARSHALL JEREMY (GB); TURNER DEREK (GB)) 24 November 1994<br>see page 6, line 9 - line 12; figure 1<br>--- | 1-4                   |
| X        | FR 2 733 155 A (TEBRO) 25 October 1996<br>see figure 3<br>---   | 1-4                   |
| A        | WO 94 13342 A (GRECO ERMANN0) 23 June 1994<br>see the whole document<br>---   | 1-4                   |
| A        | US 5 681 291 A (GALLI ROSARIA) 28 October 1997<br>see the whole document<br>-----   | 1-4                   |

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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1 July 1998

Date of mailing of the international search report

09/07/1998

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)   | Publication<br>date  |
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